Pacific Science (1977), vol. 31, no. 3

Coral–Crab Commensalism in Xanthids[1]

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ABSTRACT: Report of a coral–crab commensalism is described. Xanthid crabs of the genus *Actumnus* apparently select pieces of live coral for construction of a cover they can move from place to place. The crabs protect the shelter and serve to disseminate the coral locally.

REEF CORALS CAN BE DISSEMINATED by wave or current action when fragments of live coral are torn free and rolled to new locations where they lodge, grow, and become fixed by their own increasing weight. One of us (Lamberts) has observed xanthid crabs assisting in coral dispersal. The crabs carry live coral with them as they move about the sea floor in inshore waters at Tutuila, American Samoa. Two crabs, *Actumnus digitalis* (Rathbun 1907) and *A. antelmei* (Ward 1942), are involved.

Habits and Habitat

Twelve species of coral representing seven genera were observed to have xanthid crabs associated with them at Tutuila, American Samoa (Table 1). The corals and crabs are found in a narrow transitional zone between rubble of fringing reefs and shoreline sand. Average water depth is 1 to 2 meters, and strong tidal currents prevail. The reef corals associated with the crabs are living and typical for species ordinarily fixed to the substrate. They ranged, in our observations, from 10 to 150 g dry weight, from 2 to 5 cm in height; and were irregularly pulvinate.

The crabs, 7 to 17 mm in carapace diameter, are found in cavities opening on the flattened base of the coral. Each cavity is boot-shaped, smooth-walled, and penetrates to the center of the coral colony. Ward (1942) suggests that the cavity is carved by rasping with the heavy, trabeculated manus of the cheliped; our observations indicate that the crab progressively enlarges and shapes the cavity in which it lives.

Aquarium Observations

Living corals and crabs were placed in a seawater aquarium for observation in November 1974. The crabs were not observed to leave the corals voluntarily, and under usual circumstances could not be seen in the corals. At intervals, however, the coral colonies were propelled across the sand substrate in small jerks as if being lifted and

TABLE 1

CORALS REPRESENTED AMONG THE 25 SPECIMENS OF CORAL–CRAB COMMENSALISM

GENUS	SPECIES	NUMBER
Montipora	*ehrenbergii* Verrill	2
	elschneri Vaughan	2
	trabeculata Bernard	1
	venosa (Ehrenberg)	7
	sp.*	1
Porites	*lutea* Milne-Edwards & Haime	6
Acropora	*humilis* (Dana)	1
	palmerae Wells	1
Synaraea	*undulata* (Klunzinger)	1
Leptastrea	*purpurea* (Dana)†	1
Pavona	*divaricata* Lamarck	1
Hydnophora	*microconus* (Lamarck)	1

* Also two small colonies of the encrusting species *Cyphastrea gardineri* Matthai on small dead areas.

†An encrusting species that supplanted the original colony of *Porites*.

[1] This work was supported in part by a grant from the National Geographic Society. Manuscript received 30 March 1976.

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thrown. The corals were at times carried several centimeters in an hour.

When a coral was overturned, a crab righted it within minutes (although occasionally action was delayed up to 24 hr). The crab never relinquished hold on its coral as it emerged and climbed down to the sand directly to the point from where the coral could be rolled back into position most expeditiously. The coral was then placed so that the opening at the base was next the substrate.

Crabs removed from one coral colony and introduced to another with a shelter occupied the alternate shelter if it had dimensions similar to the original. Crabs would not enter shelters smaller than those from which they had been removed.

DISCUSSION

The association described is not unique and appears to be widespread in the Indo-West Pacific. Ward (1942), describing *Actumnus antelmei*, noted: "Locality Mauritius. Collected by Mr. Georges Antelmei who found it within a piece of dead coral which the crab was carrying from place to place." Similar species of crabs with this habit were also found at Lindeman Island, Queensland, Australia and Papua, New Guinea (Ward 1942).

Rathbun (1907) in describing *A. digitalis* made no mention of a coral-dwelling habit. She gave a type locality as Kusaie, Caroline Islands, and a second specimen from a reef, Papeete, Tahiti.

A coral from Saipan with a characteristic cavity was found in the National Museum of Natural History, Washington, D.C. The coral *Astreopora myriophthalma* (Lamarck) came from a similar area to that in Tutuila, a zone transitional between shoreline and fringing reef.

The coral–crab relationship is of interest in that the brachyuran crabs are structurally unaltered (Figure 1), unlike anomuran hermit crabs which inhabit mollusk shells. The relationship between crab and coral is such that the crab gains protection while it retains mobility, and, at the same time, the corals benefit in that they are kept upright on a sand substrate. We also suggest that the association contributes to the local dispersal of corals. The ecotone in which the crabs are found at Tutuila has numerous scattered, large colonies of *Montipora* and *Porites lutea* isolated from one another by sand. We speculate that these colonies may have originally been transported to the sites by xanthid crabs.

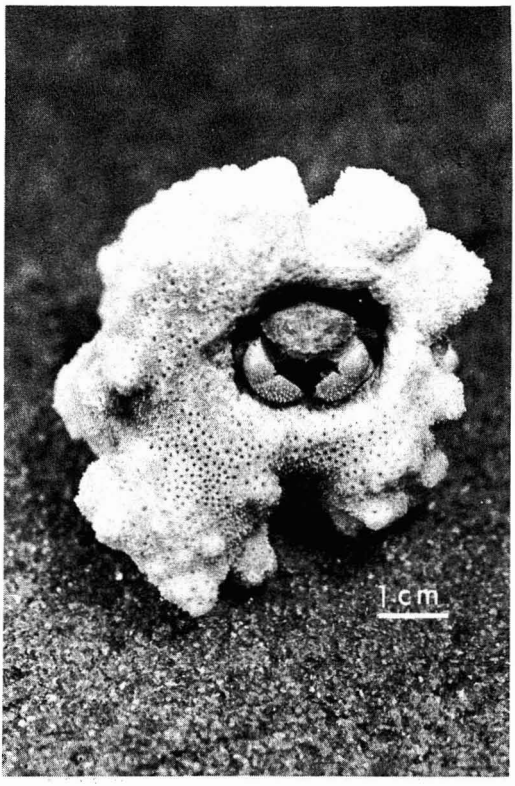

FIGURE 1. Xanthid crab *Actumnus antelmei* in cavity excavated in coral *Montipora ehrenbergii*.

ACKNOWLEDGMENTS

Amy Needham, a 13-year-old schoolgirl, first noticed these "walking rocks" while doing an aquarium project for the Girl Scouts of America. We thank Amy and her father, Ronald Needham, former director of Marine Science Programs, Faga'itua High School, Tutuila, American Samoa.

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